XXXV. *Obſervations made on the Iſland of* Hammerfoſt, *for the Royal Society. By* Jeremiah Dixon.

A JOURNAL of my OBSERVATIONS at HAMMERFOST.

1769.	
☉ May 7	At half paſt 10 A. M. anchored in Hammerfoſt-Bay, near the town of Hammerfoſt, on Hammerfoſt-Iſland.
	In the afternoon went on ſhore, to find a proper place to obſerve in; but found none.
☽ —— 8	Went on ſhore again, to find a place; and, after much ſearch and travel, fixed upon one: but, though the beſt this or the adjacent iſlands could afford, is very difficult of acceſs.
♂ —— 9	Landed the houſe and obſervatory.
☿ —— 10	Digging holes for fixing the clock-poſt, and ſtand for the tranſit-inſtrument. Note, the ground ſo much frozen and rocky, could not finiſh them this day.

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1769.

☿ May 10 The carpenters, this day, put up the houſe, ſeparate from the obſervatory; as there was not room left by the carpenter at Greenwich for fixing the tranſit-inſtrument.

♃ —— 11 Finiſhed the digging, and fixed up the poſt for the clock; alſo put up that part of the obſervatory which moves round. Note, the poſt for the clock was 3 feet deep in the ground.

♀ —— 12 Carried the inſtruments on ſhore: the carpenters working at the obſervatory.

♄ —— 13 Fixed up the clock, and ſet it a-going. Note, The upper part of the bob of the pendulum was ſet to ſcratch, marked thus $\underline{u}$ and the index to N° 14. It vibrated on each ſide of the perpendicular 1° 30′.

☉ —— 14 Put up the quadrant. It was placed upon the ſtand provided for it. The ſtand ſtood on a large caſk filled with water, very firmly fixed in the ground; and the box in the bottom of the ſtand filled with ſtones. Cloudy weather.

Placed one thermometer without doors, and the other within the obſervatory; alſo placed the barometer in a proper place.

Cloudy till ♄ May 20, in the evening; when I took the following equal altitudes of the Sun.

	Sun	West.	Sun	East.	Point on the quadrant.
	L. limb.	Up. limb.	Up. limb.	L. limb.	
	h ′ ″	h ′ ″	h ′ ″	h ′ ″	
♄ May 20	9 4 42	9 11 5	21 54 18	22 0 44	69 00
		16 26	59 37	6 5	
	15 16½	21 44	22 4 54	11 20	
	9 41 14	9 47 46−	21 17 33	21 24 6	72,00
	46 33	53 8	22 58	29 31	
	52 2−	58 33	28 20	34 50	
	10 6 1	10 12 40+	20 52 24	20 59 10	74,00
	11 28	18 9½	58 0	21 4 40	
	16 58	23 42−	21 3 27	21 10 7	
☉ May 21	10 12 13	10 18 53	These correspond to the above point 74, taken in the morning.		
	17 43	24 26			
	23 16	30 3			

From the points 72 and 74, in the above ſets of obſervations, I find the clock on the 21ſt, at noon, to be 12′ 53″,2 too ſlow, and loſes at the rate of 2″ per day of ſidereal time.

☽ May 22 Marked a meridian. The mark S° is diſtant about 2½ miles, and that N° about 2 miles. The ſituation would not allow me to have marks nearer.

Put the clock forward, to be nearer the right aſcenſion of the mid-heaven.

This afternoon came on a moſt violent ſtorm of wind, hail, and ſnow, which continued till Tueſday evening.

♂ —— 23 Cloudy, with ſnow, &c.
☿ —— 24 Ditto. Fixed the tranſit-inſtrument.
♃ —— 25
♀ —— 26
♄ —— 27 Cloudy, ſnow, &c.
☉ —— 28
☽ —— 29

1769 ♂ May 30	Sun L. limb.	West. Up. limb.	Sun	East.	Point.
	h ′ ″	h ′ ″			° ′
	9 29 28	9 35 56½			65,00
	34 48	41 17			
	40 6	46 35			
	49 46½	9 56 12			66,40
	55 6	10 1 29			
	10 0 21	6 49			
	14 4	10 20 32			68,40
	19 22	25 53			
	24 43½	31 12			
	10 38 31	45 3			70,40
	43 53	50 27½			
	49 18½	55 52			

	2d wire.	3d or middle wire.	4th wire.	
	h ′ ″	′ ″	′ ″	
☿ May 31	16 34 33½	35 19	36 4½	Sun's firſt eaſt limb paſſed the tranſit. Laſt or weſt limb paſſed at midnight.
	– – – – –	37 35+	– – – –	

Zen. diſt. Sun's upper limb 86° 47′ 50″.

	Sun Up. limb.	East. L. limb.			
	h ′ ″	h ′ ″			
♃ June 1	23 46 5	23 52 34			63,00
	51 28	57 58			
	56 50	0 3 20			
	0 10 44	0 17 22			61,00
	16 14	22 54			
	21 44	28 25			
	0 31 46½	0 38 34			59,20
	27 23	44 14½			
	43 3	49 58			

1769 ♃ June 1	Sun Up. limb. h ′ ″	Eaſt. L. limb. h ′ ″	Sun	Weſt.	Point.
	53 31 :	0 0 33½			57,40
	59 20	0 6 27			
	– – – – – –	12 29½			

	Very hazy. 1ſt wire. h ′ ″	2d wire. ′ ″	3d or middle wire. ′ ″	4th wire. ′ ″	5th wire. ′ ″	
♀ June 2 at noon.	4 39 39	0 40 24	41 10—	41 55	42 40	Sun's W. limb paſſed the tranſit.
	– – – – – –	– – – – – –	43 27	– – – – – –	– – – –	E. limb paſſed ditto.

Zen. diſt. of the Sun's upper limb 48° 5′ 50″.

The pendulum of the clock now vibrates 1° 20′ on the left hand, and 1° 30′ on the right.

This afternoon the Sun being pretty well defined, adjuſted the focus of the teleſcope to my eye, as follows.— Short eye-piece and broad little ſpeculum I. 20th. 25th. 0 19 12 to the right of 0 on the adjuſting ſcale. Ditto with micrometer I. 20th. 25th. 0 0 17 to the right.—Long eye-piece and narrow little ſpeculum I. 20th. 25th. 0 0 7 to left of 0.—Long eye-piece and broad little ſpeculum I. 20th. 25th. 0 18 17 to the right.——Theſe are the means of 8 or 9 trials each.

The ſpot near the Sun's center was thus defined.

♀ June 2	Sun L. limb. h ′ ″	Weſt. Up. limb. h ′ ″	Sun Up. limb. h ′ ″	Eaſt. L. limb. h ′ ″	Point. ° ′	
	10 55 1	– – – – – –	– – – – – –	22 21 37	70,40	
	11 00 26	11 7 2	22 20 26½	27 3½		
	– – – – – –	12 28	25 50½	32 26		
	11 15 50+	11 22 31—	21 53 48½	22 0 37	72,20	Computing from this point, the Sun paſſed the north point of the meridian at 10h 44′ 3″4,2 per clock.
	21 21	28 3	59 23	6 9½		
	26 55	33 41 :	22 4 56½	11 39		

1769	Sun	Weſt.	Sun	Eaſt.	Point.
♀ June 2	L. limb.	Up. limb.	Up. limb.	L. limb.	
	h ′ ″	h ′ ″	h ′ ″	h ′ ″	°
	11 37 3½	43 56½	21 32 1	21 39 3+	74,00
	42 45	49 42	37 49	44 45	
	48 26	55 29:	43 33	50 25	

	2d wire.	3d wire.	4th wire.	
	h ′ ″	′ ″	′ ″	
At midnight.	16 41 28	43 13½	43 59½	Sun's eaſt or firſt limb paſſed the tranſit at midnight.
	– – – – – –	45 30½	– – – – – –	Ditto weſt limb.

Zen. diſt. of the Sun's upper limb 86° 32′ 57″. Outer arc Grand Sec. Ver. 92 1 9

	Sun	Eaſt.	Sun	Weſt.	Point.	
	Up. limb.	L. limb.	L. limb.	Up. limb.		
	h ′ ″	h ′ ″	h ′ ″	h ′ ″	° ′	
♀ June 2	– – – – – –	23 10 35	10 11 30::	– – – – – –	66,40	
♄ June 3	23 9 26	15 52½	16 49	10 23 17½		
	14 38	21 9	22 9	– – – – – –		
	23 24 20	30 46½	9 50 20	9 57 44–	65,00	Computing from this point, the Sun paſſed the meridian at 4^{h} 46′ 2″,52 per clock.
	29 37	36 3½	56 37	10 3 1		
	34 53::	41 20	10 1 58½	8 21		
	– – – – – –	23 55 8	9 26 47	9 33 15½	63,00	
	23 54 00	– – – – – –	32 12	38 36		
	– – – – – –	0 5 53	37 33	– – – – – –		
	0 13 18½	0 19 55	9 1 43	9 8 24	61,00	Computing from this point, the Sun paſſed the meridian at 4^{h} 46′ 3″,48 per clock.
	18 45½	25 24	7 14½	13 49		
	24 13	30 55	12 45	19 20		
			Hazy.			The mean 4^{h} 46′ 3″.

Hence the clock is 11″,13 ſlow of ſidereal time, and loſes at the rate of 6″,84 per day.

By

By comparing the inſtant of time 16^h 44′ 3″,42 per clock the Sun paſſed the meridian under the Pole on the 2d of June, with the inſtant 16^h 44′ 22″05 per clock, it paſſed the meridian mark per tranſit inſtrument, I find it is 18″,63 later per tranſit, that is, the mark northward ſtands 18″,63 too much to the eaſt. Now by putting up another mark at the ſame diſtance as the firſt, ſo as to correſpond to the ſecond wire, and meaſuring the diſtance between this and the firſt mark, I find it to be 36 feet. This increaſed in the ratio of the zen. diſt. 86° 48′ to rad. gives 36,057 feet for the ſpace correſponding to 45′½, the time of the Sun's paſſage from the ſecond to the third or middle wire.

The reaſon of this increaſe is, that all the wires in a tranſit inſtrument, except the middle one, deſcribe leſſer circles, parallel to the middle one, which deſcribes an azimuth.——Having got what ſpace correſponds to 45″½, we have, by proportion, 14,76 feet for the ſpace, anſwering to 18″,63, which the mark muſt be moved weſtward to be in the true meridian.

THE TRANSIT OF VENUS.

Time p. clock

1769	h	′	″	
♄ June 3	13	40	00	Saw the planet Venus upon the Sun about half immerged.
		43	00	Not totally immerged.
		50	00	The planet ſeemed to be compleatly upon the Sun, but no thread of light: this was an inſtantaneous view, and through a thin cloud. The air all this time very hazy.
	19	47	00	Saw Venus upon the Sun's limb, the 2d internal contact being paſt. After this, all cloudy as before.

THE ECLIPSE OF THE SUN.

Time p. clock			Micrometer			Ap. time			Value of microm.			
h	′	″	Inch.	20th	25th	h	′	″	°	′	″	
2	3	23	3	0	20	21	13	48½		18	51,9	The verſed ſine of light
	7	44	2	13	17		18	9		16	39,1	Ditto
	10	30	2	9	21		20	54,3		15	27,4	Ditto
	13	33	2	5	12		23	57		14	6,14	Ditto
	22	5	4	17	21		32	27½		30	22,8	Diſt. of cuſps
	24	57	4	19	11		35	19		30	52,7	Ditto
	30	4	1	6	14		40	25¼		8	13,15	Verſed ſine of light
	33	37	1	4	11		43	57,6		7	33,6	Ditto

1769	Time p. clock h	′	′	Micrometer Inch.	20th	25th		Ap. time h	′	″	Value of microm. °	′	″	
♄ June 3	2	38	55	1	3	23			49	14,7		7	23·9	Verſed ſine of light
		41	3	1	4	21½			51	52,2		7	41·3	Ditto
		44	8	1	6	7			54	6.8		8	7 9	Ditto
		47	20	1	8	19			57	38,3		8	54·2	Ditto
		50	45	1	11	21		22	1	2,7		9	51,7	Ditto
	3	1	45	4	1				12	0 8		28	55 3	D ſt. of cuſps
		4	5	4	10	18			15	5,5		28	10	Ditto
	3	38	20						48	30				End of the eclipſe
				5	1	12	Sun's diameter 31′ 31″							
				5	1	12½								
				5	1	12 +								
						3	Sub. for adjuſtment							

☉ June 4 Zen. diſt. of the Sun's lower limb at noon 48° 23′

A Table ſhewing the minutes and ſeconds anſwering to the diviſions of the micrometer ſcale.

Inch.	′	″
1	6	13·08
2	12	26,16
3	18	39 24
4	24	52·32
5	31	05 40

20th	′	″	25th	″
1	0	18,654	1	0,746
2	0	37·308	2	1,492
3	0	55,962	3	2,238
4	1	14,616	4	2,984
5	1	33,270	5	3,730
10	3	6,540	10	7,460
15	4	39,810	15	11,190
20	6	13,080	20	14,920
			25	18,650

☉ June 4 | Took the dip of the ſea from the obſervatory, and found it to be nearly 21′.

Packing up the inſtruments.

☽ June 5 | Got all the inſtruments on board the Emerald.

A Table ſhewing the Height of the Mercury in Fahrenheit's Thermometer, within the Obſervatory, and without in the Shade, three Times per Day; and the Height of the Mercury in the Barometer once per Day, while at Hammerfoſt.

1769		Within obſervatory.			Without obſervatory.			Barometer.
		Morn.	Noon.	Even.	Morn.	Noon.	Even.	
May	15	—	32	—	—	32	—	27,3
	16	31	32	33	31	33	33	27,69
	17	31	36	32	31	35	31	27 69
	18	34	36	37	34	37	36	27,00
	19	34	38	39	35	39	38	27,83
	20	40	47	43	40	43	43	27,80
	21	36	36	30	36	36	30	27,70
	22	38	38	31	38	37	30	27,00
	23	36	36	35	36	36	35	27,93
	24	36	36	36	36	36	36	27,74
	25	33	34	31	33	34	31	27,60
	26	34	36	35	34	35	35	27,50
	27	33	37	37	33	37	37	27,90
	28	32	35	34	33	36	33	27,91
	29	36	39	34	36	39	33	27,74
	30	39	49	52	36	49	55	27,65
	31	50	50	46	50	50	46	27,71
June	1	43	43	40	43	43	40	27,90
	2	40	44	44	40	44	44	27,70
	3	41	42	40	41	42	40	27,60
	4	38	38	36	38	38	36	27,50

The Latitude of the Obſervatory is, per obſ. June 2, at noon 70° 38′ 22″
4, at noon 70° 38′ 23″

Note, The error of the line of collimation of the quadrant did not, upon trial, appear to be any thing worth notice.

The altitudes, northward, are ſo low as not to be depended upon.

The longitude of the obſervatory is (by comparing the obſervations of the eclipſe of the Sun with thoſe made at Greenwich),

	h	′	″	
Per 1ſt meaſurement with the micrometer	1	34	40	Theſe obſervations were made before the middle of the eclipſe.
2d ditto	1	34	35	
3d ditto	1	34	44	
13th ditto	1	35	7	Theſe obſervations were after the middle.
15th ditto	1	35	13	
End of the eclipſe	1	35	10	
	1	34	55	= 23° 43′ 45″

Eaſt of the Royal obſervatory at Greenwich.

Jere. Dixon.